

## 6061 vs 7005

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6061 and 7005 are the two most readily available aluminum alloys appropriate to **making** bicycle frames. We're also beginning to see 6066 and 6069 become available from some tubing manufacturers, but only on a very limited basis at this time. "Scandium" as used frames is actually an aluminum alloyed with a small amount of Scandium, yet is much too expensive for the general market. There are many other aluminum alloys like 7075 and 2014 that are stronger than both 6061 and 7005, but are not appropriate to **making** bike frames because they are nearly impossible to weld.

6061 (aluminum/magnesium/silicon alloy) is generally considered superior to 7005 (aluminum/zinc alloy), though in some respects 7005 can be stronger. The tensile strength of 7005-T6 is 51,000 psi vs 45,000 psi for 6061-T6. Yield strengths are 42,000 psi vs 40,000 psi, respectively. Tensile strength measures the amount stress required to cause complete failure, while yield strength measures the amount required to deform the material. The problem is that the ratings are measured on solid aluminum. When it comes to frames, the greatest differences in strength will come from the quality of the welds, selection of tubing shapes and thicknesses, and the overall design of the frame.

The truth is, in terms of the forces that a bicycle frame is typically subjected to the base material strength differences between 6061 and 7005 alloys are fairly negligible. You are unlikely to ever put more than a fraction of the stress on your frame that would cause it to reach those force levels. Nevertheless, the 7005 is the stronger of the two in those respects (6061 is superior in stretch resistance, but again those figures are far outside of the realm of real world use). So why do I say that 6061 is considered to be the superior material for **making** bike frames?

As mentioned by several posters, 6061 is easier to manipulate **making** butting and tube shaping like ovalizing and tapering less costly. On the other hand, 6061 requires precise liquid cooling as part of the heat-treatment process that all aluminum bikes frames must undergo after welding, whereas 7005 can be air cooled. The bottom line was touched upon by an earlier poster, but is essentially that we can execute a better and lighter design easier with the 6061. Due to the degree of manipulation, and the liquid quenching, a 6061 frame is typically more expensive to produce. It used to be a considerable difference just a few years ago, but 6061 frames have become more reasonable over the last few years as the technology and equipment proliferates.

Here at IBEX, we much prefer 6000-series alloys. We have completely phased-out 7005, and will begin introducing 6066 and 6069 tubesets on a few high-end models next year. In the meantime, 6061 is our mainstay and it will remain so on the vast majority of our models for some time to come.

Best regards,  
Jack A.  
IBEX Bicycles